

WHAT IS CLAIMED IS:

1.     ~~Device~~ A device for the automatic opening and closing of reaction vessels, comprising:  
        holding device ~~(16)~~ for the non-rotatable holding of one or more reaction vessels;  
        ~~(13)~~  
        a gripper ~~(11)~~ for the gripping of a lid ~~(12)~~ for the reaction vessel ~~(13)~~, wherein the gripper ~~(11)~~ has gripping jaws ~~(20, 34)~~ effective to take hold of the lid ~~(12)~~, and the gripper has no active operating device for opening and closing the gripping jaws, and  
        a rotating mechanism ~~(10)~~, for rotatable holding of the gripper ~~(11)~~; wherein  
        ~~characterised in that~~  
        the gripping jaws ~~(20, 34)~~ are arranged ~~in such a way~~ so that, when the lid ~~(12)~~ is inserted into the area between the gripping jaws ~~(20, 34)~~, it is held by the gripping jaws ~~(20, 34)~~ through frictional contact, ~~and the gripper (11) has no active operating device for opening and closing the gripping jaws (20, 34).~~
2.     ~~Device~~ The device according to claim 1, wherein  
        ~~characterised in that~~ the gripping jaws ~~(20, 34)~~ have insertion slopes. ~~(27, 39).~~
3.     ~~Device~~ The device according to claim 1, wherein  
        ~~characterised in that~~  
        the gripping jaws ~~(20, 34)~~ have on their gripping surfaces ~~(25, 37)~~ one or more cutting webs ~~(28)~~ running at right-angles to the direction of rotation.
4.     ~~Device~~ The device according to claim 3, wherein  
        ~~characterised in that~~  
        the height by which the cutting web ~~(28)~~ projects beyond the gripping surface ~~(25, 37)~~ is less than the wall thickness of the reaction vessels. ~~(13) and preferably not greater than 0.5 mm.~~

5. ~~Device~~ The device according to ~~any of claims claim 1 to 4, wherein characterised in that~~ the holding device (16) has a clamping mechanism to clamp and hold the reaction vessels (13).

6. ~~Device~~ A device for the automatic opening and closing of reaction vessels ~~in particular according to any of claims claim 1 to 5, comprising:~~

a holding device (16) for the non-rotatable holding of one or more reaction vessels;  
(13)

a gripper (11) for the gripping of a lid (12) for the reaction vessel (13), wherein the gripper (11) has gripping jaws (20, 34) effective to take hold of the lid (12); and

a rotating mechanism (10), for rotatable holding of the gripper (11); wherein

~~characterised in that~~

the holding device (16) has three perforated plates (41, 44, 45), arranged one above the other, ~~and with each of the perforated plates having the plurality of openings (43) to hold the reaction vessels (13), wherein the top and bottom perforated plates (41, 44) are arranged so as to be stationary, with the openings (43) made in them in the top and bottom perforated plates being flush with one another, and the middle perforated plate (45) is designed to slide capable of sliding between a first position in which its the openings in the middle perforated plate (43) are aligned with the openings of the other top and bottom perforated plates, and a second position in which its the openings (43) are arranged somewhat offset relative to the openings (43) of the other perforated top and bottom perforated plates, so that a reaction vessel (13) inserted in the openings (43) of the perforated plates (41, 44, 45) is immobilized clamped, and that means (51) of for fixing the middle perforated plate (45) in the second position are provided.~~

7. ~~Device~~ The device according to claim 6, wherein ~~characterised in that~~ the middle perforated plate (45) is mounted so as to slide in ~~only one a single direction, the direction of sliding.~~

8. ~~Device~~ The device according to claim 7, wherein ~~characterised in that~~ the openings (43) in the direction of sliding are wider than those at right-angles to the direction of sliding.

9. ~~Device~~ The device according to claim 7 ~~or 8, wherein~~

~~characterised in that each of the openings (43) of the middle perforated plate (45) contains a plurality of projection projections (50) which extends each extending into the interior of the an opening (43) and is each projection being located roughly in the section area between a centre line of the opening (43) concerned running in the direction of sliding, and the edge of the opening (43).~~

10. ~~Device~~ The device according to claim 9, wherein  
~~characterised in that each of the openings (43) of the top and/or bottom perforated plate (41, 44) contains a plurality of projection projections (50) which extends each extending into the interior of the an opening (43) and is arranged diametrically opposite the projections projection-(50) of the corresponding opening of the middle perforated plate (45).~~

11. ~~Device~~ The device according to ~~any of claims claim~~ 6 ~~to 10~~, further comprising  
~~characterised in that~~ means for moving and fixing (51) the middle perforated plate (45) in the second position ~~are provided~~.

12. ~~Robot with~~ A robot, comprising:  
a work platform (2);  
one or more handling arms (5, 6, 7); and  
~~characterised by a device according to any of claims claim~~ 1 ~~to 11~~, wherein one handling arm (7) is provided with the rotating mechanism (10) for rotatable holding of the gripper (11).

13. ~~Robot~~ The robot according to claim 11, further comprising  
~~characterised in that there is provided on the work platform a mount on a work platform for non-rotatable mounting of the holding device (16), for example by means of a locating device.~~